

Claims

1 1. Method for recognizing speech, comprising the steps of
- receiving a speech phrase;
- generating a signal being representative to said speech phrase;
- pre-processing and storing said signal with respect to a determined set of
5 rules;
- generating from said pre-processed signal at least one series of hypothesis
speech elements;
- determining at least one series of words being most probable to correspond to
said speech phrase by
10 - applying a predefined language model to at least said series of hypothesis
speech elements,
wherein the step of determining said series of words further comprises the
steps of:
- at first determining at least one sub-word, word or a combination of words
15 most probably being contained as a seed sub-phrase in said received speech
phrase;
- then continuing determining words or combinations of words and which are
consistent with said seed sub-phrase as at least a first successive sub-phrase
which is contained in said received speech phrase by using and evaluating ad-
20 ditional and paired and/or higher order information between the sub-phrases,
thereby decreasing the burden of searching.

2. Method according to claim 1, **characterized in that** a predefined lan-
guage model is applied to at least said series of hypothesis speech elements to
25 obtain said seed sub-phrase and
said additional and paired and/or higher order information is obtained from
said language model.

3. Method according to any of the preceding claims, **characterized in that**
30 as additional information within that language model semantic and/or prag-
matic information or the like between the sub-phrases is used.

4. Method according to any of the preceding claims, **characterized in that**
additional information within said language model is used being descriptive for
the prepositional relationship of the sub-phrases.

1 5. Method according to any of the preceding claims, **characterized in that** additional information within that language model is used being descriptive for pairs, triples and/or higher order n-tuples of sub-phrases.

5 6. Method according to any of the preceding claims, **characterized in that** a language model is used containing at least a recognition grammar built up by at least a low-perplexity part and a high-perplexity part, each of which being representative for distinct low- and high-perplexity classes of speech elements.

10 7. Method according to claim 6, **characterized in that** word classes are used as classes for speech elements or fragments.

8. Method according to any preceding claims, **characterized in that** a language model is used containing a low-perplexity recognition grammar being obtained from a conventional recognition grammar by
15 - identifying and extracting word classes of high-perplexity from the conventional grammar,
- generating a phonetic, phonemic and/or syllabic description of the high-perplexity word classes, in particular by applying a sub-word-unit grammar compiler to them, to produce a sub-word-unit grammar for each high-perplexity word class and
20 - merging the sub-word-unit grammars with the remaining low-perplexity part of the conventional grammar to yield said low-perplexity recognition grammar.

25 9. Method according to any of the preceding claims, **characterized in that** a hypothetic graph is generated for the received speech phrase including the generated sub-phrases and/or their combinations as candidates for the recognized speech phrase and
that additional information between the sub-phrases is used to constrain and
30 to restrict the search for the most probable candidate within the graph.

10. Method according to claim 9, **characterized in that** during the search candidate sub-phrases or sub-words from the high-perplexity word classes are inserted into the hypothesis graph, whereby the sub-word unit grammars for
35 the high-perplexity word classes are used as constraints as well as the respective additional semantic and/or pragmatic information.

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- 1 11. Method according to claim 10, **characterized in that** according to the constraints candidates are deleted from the hypothesis graph until an unbranched resulting graph is generated, corresponding to the most probable phrase.
- 5 12. Method according to any of the preceding claims, **characterized in that** the vocabulary - in particular of said language model - applicable for the remaining parts of the speech phrase besides the seed sub-phrase is restricted at least for one remaining part, so as to decrease the burden of search.

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